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(54) Portable self-contained injector for perfusions

(57) Injector characterised by the association of a transparent fluidtight casing (1) and a neutral liquefied gas compression assembly (18), the said casing containing a flexible bag (2) containing liquid which is to be perfused and having a removable plate 8 on its upper face and provided with a fluidtight connection with the flow line 15 and safety elements.

FIG.1

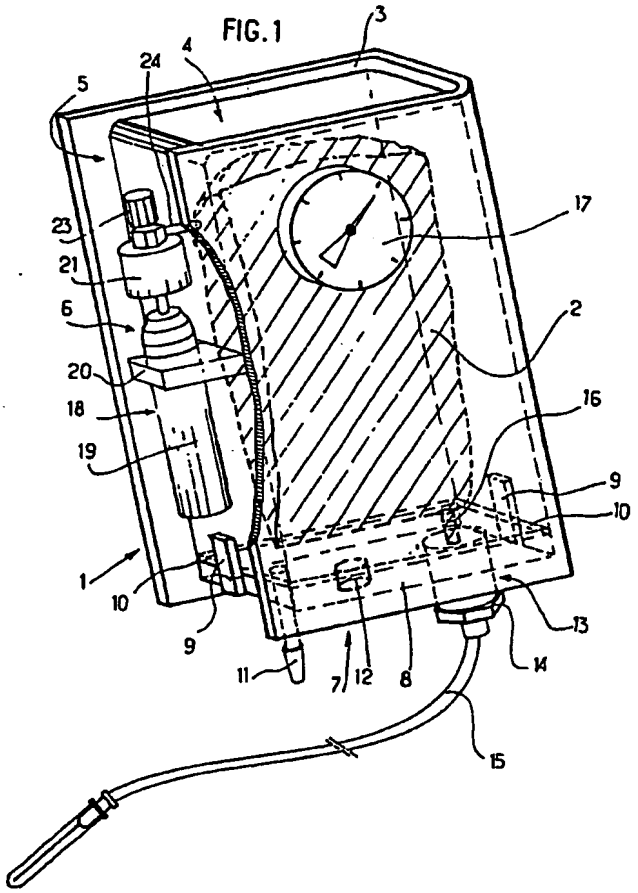

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FIG. 1

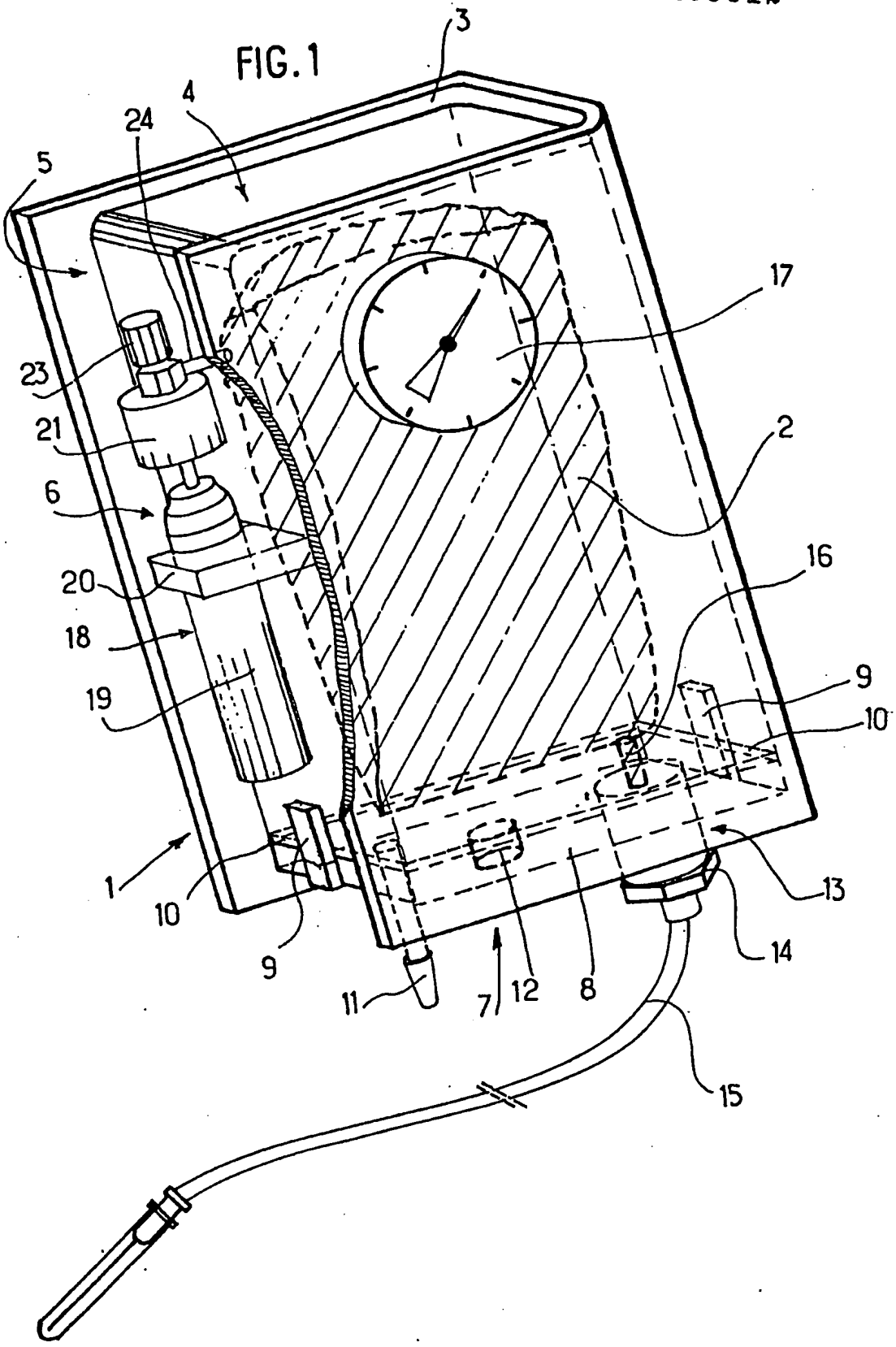


FIG. 2

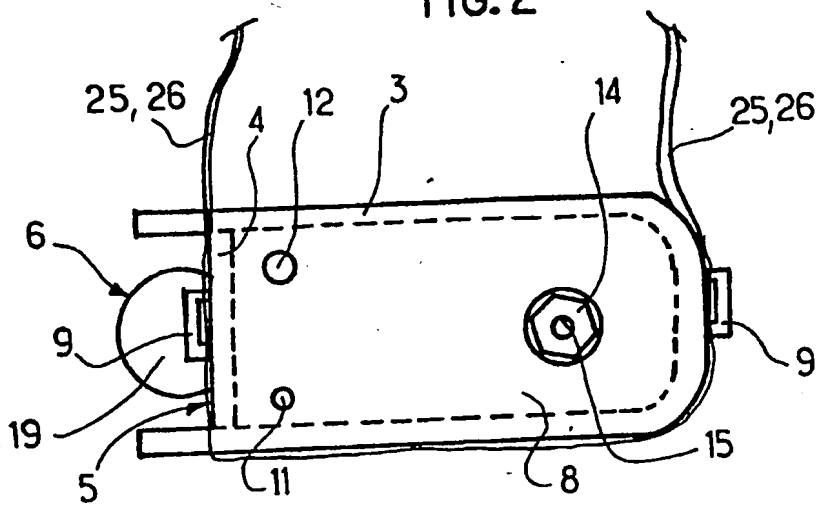
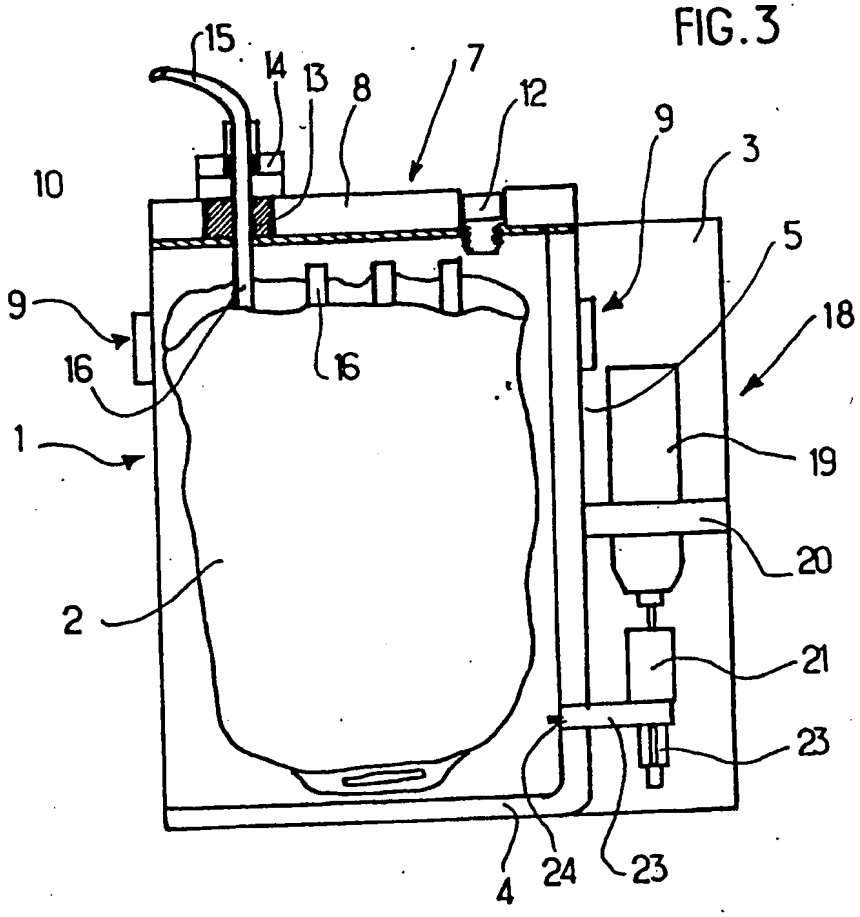

25, 26
4
12
3
14
25,26
6
9
19
5
11
8
15
9

FIG. 3


15
14
13
8
7
12
9
3
10
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9
18
16
16
1
19
20
2
21
23
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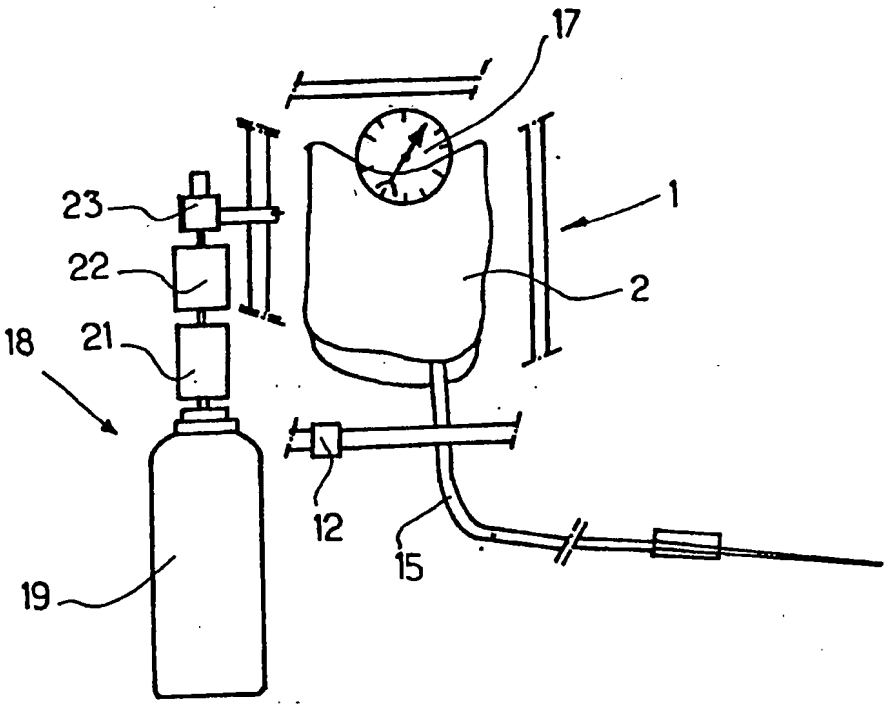
24
23

FIG. 4



SPECIFICATION

Portable self-contained injector for perfusions, particularly in the case of road accident victims

The present invention relates to a portable self-contained injector for carrying out perfusions, particularly in the case of road accident victims.

The injection of a biological liquid, an act referred to as a perfusion, is currently still carried out by means of a phial containing the liquid to be injected, suspended from the end of a support about 1 metre above the patient.

The liquid empties by gravity at a rate of flow which can be regulated by what is known as a drop-by-drop device or 'drip' which reduces the rate of flow by restriction or compression of the flexible pipe carrying the liquid which is to be injected.

Although this equipment is used in a hospital room, it is however bulky, difficult to move, clumsy and slow to set up and therefore not readily adapted to the rendering of assistance in the field as in the majority of cases of victims of catastrophes or road accidents.

Moreover, doctors realise the basic usefulness of perfusions of biological liquids, particularly water. Indeed, the loss of blood, the emotional shock and the conditions of sanitary transportation to the place of treatment do give rise to systematic dehydration requiring a direct input of water, drinks being inadequate.

The self-contained and portable apparatus according to the invention, by reason of its convenience and simplicity of use, is aimed at providing a precious aid and a new facility available to treatment teams in catastrophes and road accidents and work accidents, teams which have to encounter all kinds of difficulties and in most cases have to treat numerous injured persons at one and the same time.

Initial care and attention has been demonstrated as determining the vital or functional prognosis of victims and to be effective must therefore employ reliable and rapidly implemented equipment.

The apparatus according to the invention does not require any skill in use. It is easily and quickly positioned. Carried by the injured person, there is no longer any overhead supporting structure nor connecting line, causes of the main hindrance in handling and transporting the patient.

To this end, the self-contained and portable injector for perfusion according to the invention is composed of a fluidtight casing enclosing the flexible bag containing the physiological liquid. One of the walls of the casing is removable and incorporates the main monitoring and safety elements: decompression valve, safety valve and passage for the flexible feed line, at the end of which is an injection or perfusion needle.

The casing communicates via an orifice with a compression assembly comprising a neutral liquid gas cartridge and an injector, followed by an element for regulating and controlling the pressure. The casing has straps by which it is fixed to one of the victim's limbs.

Apart from the main advantages already mentioned above, the following additional advantages can be mentioned:

. lightness and small dimensions permitting of easy usage without discomfort for the injured person or patient;

. simplicity of the constituent parts guaranteeing a low prime cost;

. ensurance of a constant rate of flow.

The technical characteristics of the invention and other advantages are set forth in the ensuing description which is given by way of non-limitative example, relative to an embodiment illustrated in the accompanying drawings, in which:

Figure 1 is a perspective view of the perfusion injector according to the invention;

Figure 2 is a plan view of the upper face;

Figure 3 is a view in longitudinal section through the plan, and

Figure 4 is a diagrammatic view illustrating the succession of functions which make it possible for the perfusion to be carried out in an entirely safe manner.

A basic embodiment will be described hereinafter but it will be appreciated that various simple variations and secondary modifications will in no way alter the invention. Similarly, variations in choice and use of materials will not constitute any supplementary inventive element and consequently will not depart from the framework of the present protection.

The injector is composed of a fluidtight casing 1 of for example parallelepiped form and of dimensions suited to those of the flexible bag 2 containing the physiological liquid to be injected. The casing will preferably be of transparent plastics material in order to permit of immediate visual monitoring of the condition of the inner bag.

The casing 1 is for example but not necessarily formed from a sheet of transparent plastics material forming a U-shaped envelope 3 bounding between its two arms an open rectangular space. The said space is enclosed at the sides by an L-shaped closure member 4 which is bent over and glued onto the inside faces of the walls of the envelope 3.

These latter extend beyond the side face 5 constituted by the long side of the closure member 4, to form an outer lateral space 6 protected from shocks by the extensions of the wings of the envelope 3. This space will be used for technical purposes and will be referred to hereinafter as the technical space 6.

At its upper side 7, the casing 1 is closed by a removable front plate 8 which lies on the

abutting edges of the envelope by means of rapid fastenings such as 9. Sealing tightness is guaranteed by the interposition of a gasket 10, for example a flat gasket or one of any other suitable profile.

The front plate 8 on the upper face 7 comprises, screwed or fixed in appropriate manner into its body, a decompression valve 11 and a safety valve 12 calibrated or regulated to a limited pressure beyond which satisfactory operating conditions are no longer guaranteed.

The front plate 8 also has a fluidtight passage 13 fitted with a gasket 14 permitting of fluidtight lead-through of the flexible flow line 15 on the end of which is an injection or perfusion needle. The other end of the pipe is mounted originally and with no possibility of separation, on one of the outlet nozzles 16 of the flexible bag 2.

On one of its faces, the casing 1 comprises a pressure gauge 17 indicating the pressure obtaining in its inner space.

In the technical space 6 extending along one side of the casing is housed a compression assembly 18 supplied by a pressurised neutral gas cartridge 19 which is in the liquid state and which is maintained by one or two cross-members such as 20.

The compression assembly 18 is continued by an injection module 21 which receives the gas at the pressure in the cartridge, a relief valve 22 and flow regulator 23 adapted for manual control, the outlet 24 of which discharges into the casing after passing through this in fluidtight manner by adhesion or interposition of a circular sea or any other means.

The presence of the pressure relief valve 22 is not vital because the flow regulator 23 can fulfil the same function. However, it does make it possible to obtain greater facility and precision of pressure adjustment.

Two straps 25 and 26 are provided for fixing the casing on one of the victim's limbs. In its commercial version, the injector will have these straps attached to the casing or threaded through slots so that the casing can be strapped on at two levels.

Preferably chosen as the gas will be dichlorodifluoromethane R 12 known under the designation "freon" or mixtures derived from existing fluorinated chlorides. This gas is packed in small-capacity cartridges which are easily housed in the technical space 6. The containers can be disposed of after use. The capacity proves adequate for complete evacuation of the bags 2 currently available on the market, in other words 50 ml of liquid for perfusion purposes.

These cartridges have the particular feature of containing liquid gas inside them.

The various phases of operation of the slow perfusion injector according to the invention will now be explained.

In order to use the injector according to the invention, the following procedure should be adopted. With the flexible bag 2 fitted inside the case 1 with its flow line 15, the latter is passed through the lid, through the seal, after which the casing is closed again by means of the rapid fasteners 9.

The flexible bag 2 is placed in position in the casing which is closed again. The inert gas cartridge is changed and pushed fully into its housing. The appliance is fixed to the nearby limb of the patient, generally the thigh, by using the straps 25 and 26. The perfusion needle is introduced into the patient's skin. The gas cartridge is changed if the change has been previously forgotten.

The next stage is to build up pressure. To do this, the gas is released by acting on the regulator 23 and the pressure is progressively shut down to about 10 millibars beyond the chosen pressure, after which it is stabilised at the final level.

If it is exceeded, when the pressure is applied or if the pressure is accidentally overshot, it is sufficient to drain off the excess through the decompression valve and then to readjust the pressure as indicated hereinabove.

The liquid is evacuated from the bag as soon as the pressure threshold is exceeded, the threshold being determined by the characteristics of the apparatus.

The gas reserve proves adequate to evacuate all the liquid contents of the bag 2. When the operation is completed, the liquid having been completely injected, the gas continues to fill the casing and the pressure in this latter rises with no danger by virtue of the safety valve and the reserve of gas in the cartridge, which arrives at its limit of use.

The apparatus is removed from the patient before it is opened so that it can be restored to operating condition by decompression, replacement of the gas cartridge and of the flexible bag 2.

The invention above cannot be confined just to the means, materials and elements described, all their equivalence and all their alternatives, additions and other modifications which involve no inventive contribution being on the contrary entirely within its framework.

CLAIMS

1. Portable self-contained injector for perfusion, in the case of victims of catastrophes and in particular road accident victims, characterised by the association of a fluidtight transparent casing (1) constructed in two pieces with a compression assembly (18), the said casing containing a flexible bag (2) and being formed by a removable wall (9) on the upper face (8) provided with a fluidtight connector to the flow line and several security elements.

2. Injector according to Claim 1, characterised in that the body of the casing is composed of an envelope (3) of transparent material, formed to a U-shape, and an L-shape closure member defining by extending beyond

the open side of the envelope a technical space (6) for housing the compression assembly (18).

3. Injector according to Claim 1, characterised in that the compression assembly (18) is composed of a neutral pressurised liquid gas cartridge (19) connected to an injection module (21) followed by a pressure relief valve (22) and a manually operated flow regulator (23), the outlet from the said regulator discharging into the space inside the casing.

4. Injector according to Claim 1, characterised in that the upper face wall comprises on the one hand a fluid-tight lead-through to allow passage of the flexible flow line (15), fitted onto one of the outlet nozzles (16) of the bag (2) and on the other a decompression valve (11) and a safety valve (12).

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